

Accordingly, it is possible to suppress the decrease and variation of transmission of exposure light in optical paths inside the mask room and substrate room and to obtain stable and adequate exposure power, the decrease and variation being caused by the absorption of exposure light energy. Additionally, because impurity concentrations of specific gas in the reserve rooms are set to be higher than those of the mask room and substrate room, the cost of the equipment, which is needed to set and keep the specific gas environment in the reserve rooms, can be reduced.

REMARKS

Favorable consideration of this application, as presently amended, is respectfully requested.

The present preliminary amendment is submitted to place the above-identified application in more proper format under United States practice.

By the present preliminary amendment the claims are amended to correct for minor informalities, to no longer recite any multiple dependencies, and to clarify the language recited therein. The changes made to the claims are believed to be self-evident from the original disclosure, and thus are not deemed to raise any issues of new matter. Further, no changes to the claims are believed to narrow the claims in any aspect.

The Abstract is also amended by the present response to make minor clarifications.

The present application is believed to be in condition for a full and thorough examination on the merits. An early and favorable consideration of the present application is hereby respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599
Surinder Sachar
Registration No. 34,423



22850

Tel.: (703) 413-3000
Fax: (703) 413-2220
GJM:SNS\la
I:\ATTY\SNS\213876US-PR.DOC

Marked-Up Copy

Serial No: 09/926,149

Amendment Filed on: HEREWITH

IN THE TITLE

Please delete the title and replace with the following title:

[EXPOSURE APPARATUS AND EXPOSURE METHOD, AND DEVICE
MANUFACTURING METHOD] EXPOSURE DEVICE, EXPOSURE METHOD, AND
DEVICE MANUFACTURING METHOD

IN THE CLAIMS

--1. (Amended) An exposure apparatus that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, the exposure apparatus comprising:

a plurality of sealed rooms in each of which said mask is temporarily stored, including a mask room that covers at least an optical path near said mask of the optical path of said exposure[-illumination] light from said mask to said substrate; and

wherein said sealed rooms are filled with the same kind of specific gas, or different kinds of specific gases, having a characteristic of absorbing little of said exposure [illumination] light, and wherein the concentration of impurities in said specific gas in at least one of said sealed rooms is different from the concentration of impurities in said specific gas in said mask room.

10. (Amended) An exposure apparatus according to claim 2, further comprising [wherein in a path for carrying said mask,] an energy-beam-emitting portion [is] provided in

a path for carrying said mask to irradiate [which irradiates] said mask with an energy beam in an ultraviolet range.

12. (Amended) An exposure apparatus according to claim 2, further comprising [wherein in said mask-reserve room,] a mask-transport system [is] arranged in said mask-reserve room to transport [which transports] said mask from and to said mask room.

13. (Amended) An exposure apparatus according to claim 1, further comprising:
a projection optical system that projects said exposure[-illumination] light emitted from said mask onto said substrate, and

wherein said mask room covers the optical path between said mask and said projection optical system.

19. (Amended) An exposure apparatus according to claim 1, further comprising:
a substrate room constituted by a sealed room that covers at least an optical path near a substrate of the optical path of said exposure[-illumination] light from said mask to said substrate and that is filled with said specific gas.

21. (Amended) An exposure apparatus according to claim 19, further comprising:
a projection optical system that projects said exposure[-illumination] light emitted from said mask onto said substrate, and

wherein said substrate room covers the optical path between said substrate and said projection optical system.

22. (Amended) An exposure apparatus that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, the exposure apparatus comprising:

a plurality of sealed rooms in each of which said substrate is temporarily stored, including a substrate room that covers at least an optical path near said substrate of the optical path of said exposure[-illumination] light from said mask to said substrate; and

wherein said sealed rooms are filled with the same kind of specific gas, or different kinds of specific gases, having a characteristic of absorbing little of said exposure[illumination] light, and wherein the concentration of impurities in said specific gas in at least one of said sealed rooms is different from the concentration of impurities in said specific gas in said substrate room.

27. (Amended) An exposure apparatus according to claim 23, further comprising [wherein in said substrate-reserve room,] a substrate-transport system [is] arranged in said substrate-reserve room to transport [which transports] said substrate from and to said substrate room.

30. (Amended) An exposure apparatus that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, the exposure apparatus comprising:

a sealed room that stores said mask so as to expose said substrate to said exposure[-illumination] light and that is filled with specific gas having a characteristic of absorbing little of said exposure [illumination] light; and

a gas-charging mechanism that charges a sealed-type mask case containing said mask with said specific gas again after the completion of exposure using said mask in said sealed room.

31. (Amended) An exposure apparatus according to [any one of] claim[s] 4[, 20 and 24], wherein said gas-replacement mechanism performs said gas replacement by making said specific gas flow continuously.

32. (Amended) An exposure apparatus according to [one of] claim[s] 5 [and 26], wherein said gas-replacement mechanism spends time not less than 10 seconds in performing said gas replacement.

[a first step of] filling a sealed space that covers at least an optical path near said substrate of the optical path of said exposure[-illumination] light from said mask to said substrate with low-absorbent gas that has an impurity concentration lower than a first concentration and that has a characteristic of absorbing little of said exposure [illumination] light;

[a second step of] temporarily storing said substrate in a reserve room adjacent to said sealed space before carrying said substrate into said sealed space and replacing gas in said reserve room with said low-absorbent gas that has an impurity concentration not lower than a first concentration and lower than a second concentration; and

[a third step of] transporting said substrate to a predetermined position in said sealed space and transferring said pattern onto said substrate.

40. (Amended) An exposure method according to [one of] claim[s] 38 [and 39], wherein in [the] said gas replacement [of said second step], said low-absorbent gas is supplied to said reserve room after discharging gas in said reserve room to decrease the internal pressure.

41. (Amended) An exposure method according to [one of] claim[s] 38 [and 39], wherein said exposure[-illumination] light is light having a wavelength not longer than 200nm.

43. (Amended) A device manufacturing method including a lithography process, wherein in said lithography process, exposure is performed using an exposure apparatus according to [any one of] claim[s] 1 [through 30].

44. (Amended) A device manufacturing method including a lithography process, wherein in said lithography process, exposure is performed using an exposure method according to [one of] claim[s] 38 [and 39].

33. (Amended) An exposure apparatus according to [any one of] claim[s] 1 [through 30], wherein part of at least one of said sealed rooms, which part contacts said specific gas, is coated with material emitting little gas.

34. (Amended) An exposure apparatus according to [any one of] claim[s] 1 [through 30], wherein said specific gas is supplied and used in a circulated manner in at least one of said sealed rooms.

36. (Amended) An exposure apparatus according to [any one of] claim[s] 1 [through 30], wherein said exposure[-illumination] light is light having a wavelength not longer than 200nm.

38. (Amended) An exposure method that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, the exposure method comprising:

[a first step of] filling a sealed space that covers at least an optical path near said mask of the optical path of said exposure[-illumination] light from said mask to said substrate with low-absorbent gas that has an impurity concentration lower than a first concentration and that has a characteristic of absorbing little of said exposure [illumination] light;

[a second step of] temporarily storing said mask in a reserve room adjacent to said sealed space before carrying said mask into said sealed space and replacing gas in said reserve room with said low-absorbent gas that has an impurity concentration not lower than a first concentration and lower than a second concentration; and

[a third step of] transporting said mask to a predetermined position in said sealed space and transferring said pattern onto said substrate.

39. (Amended) An exposure method that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, the exposure method comprising:

45. (Amended) An exposure apparatus that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, said mask having a thin film attached thereto via a frame, the exposure apparatus comprising:

a gas-replacement room in which a space enclosed by said thin film, said frame and said mask is filled with specific gas having a characteristic of absorbing little of said exposure [illumination] light.

46. (Amended) An exposure apparatus according to claim 45, further comprising:

a mask room that covers at least an optical path near said mask of the optical path of said exposure[-illumination] light from said mask to said substrate; and

wherein said gas-replacement room is arranged adjacent to said mask room.

50. (Amended) An exposure apparatus that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, the exposure apparatus comprising:

a plurality of sealed rooms in each of which said mask is temporarily stored, including a mask room that covers at least an optical path near said mask of the optical path of said exposure[-illumination] light from said mask to said substrate;

a transport mechanism that transports said mask between said plurality of sealed rooms; and

an energy-beam-emitting portion that is provided in a path for transporting said mask and irradiates said mask with an energy beam in an ultraviolet range.

53. (Amended) An exposure method that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, said mask having a thin film attached thereto via a frame, the exposure method comprising:

[a first step of] filling a sealed space that covers at least an optical path near said mask of the optical path of said exposure[-illumination] light from said mask to said substrate with

low-absorbent gas that has a characteristic of absorbing little of said exposure [illumination] light;

[a second step of] filling a space enclosed by said thin film, said frame and said mask with specific gas having a characteristic of absorbing little of said exposure [illumination] light before transporting said mask into said sealed space; and

[a third step of] transporting said mask onto a predetermined position in said sealed space and transferring said pattern onto said substrate.

54. (Amended) An exposure method that transfers a pattern of a mask onto a substrate by irradiating said mask with exposure[-illumination] light, the exposure method comprising:

[a first step of] filling a sealed space that covers at least an optical path near said mask of the optical path of said exposure[-illumination] light from said mask to said substrate with low-absorbent gas that has a characteristic of absorbing little of said exposure [illumination] light;

[a second step of] irradiating said mask with an energy beam in an ultraviolet range before transporting said mask into said sealed space; and

[a third step of] transporting said mask onto a predetermined position in said sealed space and transferring said pattern onto said substrate.--

IN THE ABSTRACT

Please amend the Abstract on page 124 to read as follows:

--ABSTRACT

After a mask [(R)] is carried into a reserve room [(RI)] for temporarily storing before carrying into a mask room [(15)] filled with specific gas that has an impurity concentration lower than a first concentration (e.g. 1ppb) and that has a characteristic of absorbing little [of] exposure light, gas-replacement mechanisms [(23, 24, etc.)] replace gas in the reserve room

with specific gas having an oxygen concentration [(e.g. 10ppb)] not lower than the first concentration. Therefore, when subsequently carrying the mask [(R)] into the mask room, impurities from the outside (including absorbent gas) can be substantially prevented from getting into the optical path inside the mask room. When replacing a wafer [(W)], gas in a reserve room [(WI)] is also replaced in the same way as the above. Accordingly, it is possible to suppress the decrease and variation of transmission of exposure light in optical paths inside the mask room and substrate room and to obtain stable and [enough] adequate exposure power, the decrease and variation being caused by the absorption of exposure light energy. Additionally, because impurity concentrations of specific gas in the reserve rooms are set to be higher than those of the mask room and substrate room, the cost of the equipment, which is needed to set and keep the specific gas environment in the reserve rooms, can be reduced.--